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I. BACKGROUND

Plaintiff CyWee Group Ltd. (“CyWee”) has asserted the ’438 Patent and ’978 Patent against Defendants Huawei Device Co. Ltd., Huawei Device (Dongguan) Co. Ltd., and Huawei Device USA, Inc. (collectively “Huawei”). CyWee has asserted the ’438 Patent and ’978 Patent before. Specifically, this Court has construed both patents in *CyWee Group Ltd. v. Samsung Electronics Co., Ltd.*, et al., No. 2:17-cv-00140-WCB-RSP (the “*Samsung* case”). Six of the seven terms (all terms but the “signal set” term) now presented for construction in the present action were construed in a claim construction order in the *Samsung* case at Dkt. No. 117 (the “*Samsung* Claim Construction Order”). The *Samsung* Claim Construction Order was subject to objections presented by the *Samsung* Defendants to Judge Bryson. An order on the objections was issued at Dkt. No. 153 (the “*Samsung* Order on Objections”). Other Courts have also addressed issues related to the terms currently in question including *CyWee Group Ltd. v. Apple, Inc.*, No. 14-cv-01853-HSG (N.D. Cal.) and *CyWee Group, Ltd. v. Motorola Mobility LLC*, No. 17-780-RGA (D. Del.).

The ’438 Patent and ’978 Patent each teach a “pointing” device that translates its own movement relative to a first reference frame into a movement pattern in a display plane of a second display reference frame. Because the display plane is chosen to correspond with a particular display device, such as a computer screen, an associated processor generating a display signal to the display device can then “move” an indicator (e.g., a computer icon or cursor) on the display according to the movement pattern. ’438 Patent Abstract; ’978 Patent Abstract.

This general concept predates the asserted patents. *See, e.g.*, ’438 Patent 2:38–47 (referencing prior art). The patents, however, specifically purport to solve a prior-art problem of inaccurately calculating the change in angular velocities and accelerations of the device when

subjected to unexpected movements, particularly in a direction parallel to the force of gravity. *See id.* 2:55–3:5. The patents also criticize the prior art for outputting only a two-dimensional movement pattern. *See id.* 2:47–55 (“the pointing device of Liberty cannot output deviation angles readily in [a] 3D reference frame but rather a 2D reference frame only and the output of such device having 5-axis motion sensors is a planar pattern in [a] 2D reference frame only”).

To address these shortcomings, the ’438 Patent teaches (1) use of various sensors to measure angular velocities and axial accelerations along three reference axes of the device, and (2) predicting the axial accelerations along three reference axes from the measured angular velocities. The claimed device uses the measured angular velocities, measured axial accelerations, and predicted axial accelerations to calculate a deviation of the yaw, pitch, and roll angles of the device over time. The claimed device then translates that deviation into a movement pattern within the display reference frame. *See generally* ’438 Patent 7:56–9:5.

The ’978 Patent, which is a continuation-in-part of the ’438 Patent, adds magnetism to the methodology. Specifically, a magnetometer measures magnetism associated with three reference axes of the first reference frame. The ’978 Patent also teaches predicting the magnetism associated with each of the three axes and using both the measured and predicted magnetisms—along with the measured angular velocities, measured axial accelerations, and predicted axial accelerations already contemplated by the ’438 Patent—to determine deviation of the yaw, pitch, and roll and translate the resultant angles to a movement pattern in a display reference frame. *See generally* ’978 Patent 22:9–23:8; *see also, e.g., id.* Fig.8 items 745, 750, Fig. 11 items 1160, 1165.

II. LEGAL PRINCIPLES

“It is a ‘bedrock principle’ of patent law that ‘the claims of a patent define the invention to which the patentee is entitled the right to exclude.’” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312

(Fed. Cir. 2005) (en banc) (quoting *Innova/Pure Water Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). To determine the meaning of the claims, courts start by considering the intrinsic evidence. *Id.* at 1313; *C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 861 (Fed. Cir. 2004); *Bell Atl. Network Servs., Inc. v. Covad Commc'ns Group, Inc.*, 262 F.3d 1258, 1267 (Fed. Cir. 2001). The intrinsic evidence includes the claims themselves, the specification, and the prosecution history. *Phillips*, 415 F.3d at 1314; *C.R. Bard, Inc.*, 388 F.3d at 861. The general rule—subject to certain specific exceptions discussed *infra*—is that each claim term is construed according to its ordinary and accustomed meaning as understood by one of ordinary skill in the art at the time of the invention in the context of the patent. *Phillips*, 415 F.3d at 1312–13; *Alloc, Inc. v. Int'l Trade Comm'n*, 342 F.3d 1361, 1368 (Fed. Cir. 2003); *Azure Networks, LLC v. CSR PLC*, 771 F.3d 1336, 1347 (Fed. Cir. 2014) (“There is a heavy presumption that claim terms carry their accustomed meaning in the relevant community at the relevant time.”) (vacated on other grounds).

“The claim construction inquiry. . . begins and ends in all cases with the actual words of the claim.” *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1248 (Fed. Cir. 1998). “[I]n all aspects of claim construction, ‘the name of the game is the claim.’” *Apple Inc. v. Motorola, Inc.*, 757 F.3d 1286, 1298 (Fed. Cir. 2014) (quoting *In re Hiniker Co.*, 150 F.3d 1362, 1369 (Fed. Cir. 1998)). A term’s context in the asserted claim can be instructive. *Phillips*, 415 F.3d at 1314. Other asserted or unasserted claims can also aid in determining the claim’s meaning, because claim terms are typically used consistently throughout the patent. *Id.* Differences among the claim terms can also assist in understanding a term’s meaning. *Id.* For example, when a dependent claim adds a limitation to an independent claim, it is presumed that the independent claim does not include the limitation. *Id.* at 1314–15.

“[C]laims ‘must be read in view of the specification, of which they are a part.’” *Id.* (quoting *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995) (en banc)). “[T]he specification ‘is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.’” *Id.* (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)); *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1325 (Fed. Cir. 2002). But, “[a]lthough the specification may aid the court in interpreting the meaning of disputed claim language, particular embodiments and examples appearing in the specification will not generally be read into the claims.” *Comark Commc’ns, Inc. v. Harris Corp.*, 156 F.3d 1182, 1187 (Fed. Cir. 1998) (quoting *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1571 (Fed. Cir. 1988)); *see also Phillips*, 415 F.3d at 1323. “[I]t is improper to read limitations from a preferred embodiment described in the specification—even if it is the only embodiment—into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited.” *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 913 (Fed. Cir. 2004).

The prosecution history is another tool to supply the proper context for claim construction because, like the specification, the prosecution history provides evidence of how the U.S. Patent and Trademark Office (“PTO”) and the inventor understood the patent. *Phillips*, 415 F.3d at 1317. However, “because the prosecution history represents an ongoing negotiation between the PTO and the applicant, rather than the final product of that negotiation, it often lacks the clarity of the specification and thus is less useful for claim construction purposes.” *Id.* at 1318; *see also Athletic Alternatives, Inc. v. Prince Mfg.*, 73 F.3d 1573, 1580 (Fed. Cir. 1996) (ambiguous prosecution history may be “unhelpful as an interpretive resource”).

Although extrinsic evidence can also be useful, it is “less significant than the intrinsic record in determining the legally operative meaning of claim language.” *Phillips*, 415 F.3d at 1317 (quoting *C.R. Bard, Inc.*, 388 F.3d at 862). Technical dictionaries and treatises may help a court understand the underlying technology and the manner in which one skilled in the art might use claim terms, but technical dictionaries and treatises may provide definitions that are too broad or may not be indicative of how the term is used in the patent. *Id.* at 1318. Similarly, expert testimony may aid a court in understanding the underlying technology and determining the particular meaning of a term in the pertinent field, but an expert’s conclusory, unsupported assertions as to a term’s definition are entirely unhelpful to a court. *Id.* Generally, extrinsic evidence is “less reliable than the patent and its prosecution history in determining how to read claim terms.” *Id.* The Supreme Court recently explained the role of extrinsic evidence in claim construction:

In some cases, however, the district court will need to look beyond the patent’s intrinsic evidence and to consult extrinsic evidence in order to understand, for example, the background science or the meaning of a term in the relevant art during the relevant time period. *See, e.g., Seymour v. Osborne*, 11 Wall. 516, 546 (1871) (a patent may be “so interspersed with technical terms and terms of art that the testimony of scientific witnesses is indispensable to a correct understanding of its meaning”). In cases where those subsidiary facts are in dispute, courts will need to make subsidiary factual findings about that extrinsic evidence. These are the “evidentiary underpinnings” of claim construction that we discussed in *Markman*, and this subsidiary fact finding must be reviewed for clear error on appeal.

Teva Pharm. USA, Inc. v. Sandoz, Inc., 135 S. Ct. 831, 841 (2015).

A. Departing from the Ordinary Meaning of a Claim Term

There are “only two exceptions to [the] general rule” that claim terms are construed according to their plain and ordinary meaning: “1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of the claim term either

in the specification or during prosecution.”² *Golden Bridge Tech., Inc. v. Apple Inc.*, 758 F.3d 1362, 1365 (Fed. Cir. 2014) (quoting *Thorner v. Sony Computer Entm’t Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012)); *see also GE Lighting Solutions, LLC v. AgiLight, Inc.*, 750 F.3d 1304, 1309 (Fed. Cir. 2014) (“[T]he specification and prosecution history only compel departure from the plain meaning in two instances: lexicography and disavowal.”). The standards for finding lexicography or disavowal are “exacting.” *GE Lighting Solutions*, 750 F.3d at 1309.

To act as his own lexicographer, the patentee must “clearly set forth a definition of the disputed claim term,” and “clearly express an intent to define the term.” *Id.* (quoting *Thorner*, 669 F.3d at 1365); *see also Renishaw*, 158 F.3d at 1249. The patentee’s lexicography must appear “with reasonable clarity, deliberateness, and precision.” *Renishaw*, 158 F.3d at 1249.

To disavow or disclaim the full scope of a claim term, the patentee’s statements in the specification or prosecution history must amount to a “clear and unmistakable” surrender. *Cordis Corp. v. Boston Sci. Corp.*, 561 F.3d 1319, 1329 (Fed. Cir. 2009); *see also Thorner*, 669 F.3d at 1366 (“The patentee may demonstrate intent to deviate from the ordinary and accustomed meaning of a claim term by including in the specification expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope.”). “Where an applicant’s statements are amenable to multiple reasonable interpretations, they cannot be deemed clear and unmistakable.” *3M Innovative Props. Co. v. Tredegar Corp.*, 725 F.3d 1315, 1326 (Fed. Cir. 2013).

² Some cases have characterized other principles of claim construction as “exceptions” to the general rule, such as the statutory requirement that a means-plus-function term is construed to cover the corresponding structure disclosed in the specification. *See, e.g., CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1367 (Fed. Cir. 2002).

B. Definiteness Under 35 U.S.C. § 112, ¶ 2 (pre-AIA) / § 112(b) (AIA)³

Patent claims must particularly point out and distinctly claim the subject matter regarded as the invention. 35 U.S.C. § 112, ¶ 2. A claim, when viewed in light of the intrinsic evidence, must “inform those skilled in the art about the scope of the invention with reasonable certainty.” *Nautilus Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2129 (2014). If it does not, the claim fails § 112, ¶ 2 and is therefore invalid as indefinite. *Id.* at 2124. Whether a claim is indefinite is determined from the perspective of one of ordinary skill in the art as of the time the application for the patent was filed. *Id.* at 2130. As it is a challenge to the validity of a patent, the failure of any claim in suit to comply with § 112 must be shown by clear and convincing evidence. *Id.* at 2130 n.10. “[I]ndefiniteness is a question of law and in effect part of claim construction.” *ePlus, Inc. v. Lawson Software, Inc.*, 700 F.3d 509, 517 (Fed. Cir. 2012).

III. CONSTRUCTION OF AGREED TERMS

Prior to the oral hearing, the parties agreed to the following terms:

Term	Agreed Construction
“reference frame” (’438 Patent claims 1, 4, 14, 15, 19; ’978 Patent claim 10)	“a coordinate system having axes that intersect at an origin”
“spatial pointer reference frame” “spatial pointer reference frame of a three-dimensional (3D) pointing device” “spatial reference frame of the 3D pointing device” (’438 Patent claims 1, 4, 14, 15, 19; ’978 Patent claim 10)	“reference frame associated with the 3D pointing device, which always has its origin at the same point in the device and in which the axes are always fixed with respect to the device”

³ Because the applications resulting in the ’438 Patent and ’978 Patent were filed before September 16, 2012, the effective date of the AIA, the Court refers to the pre-AIA version of § 112.

(Dkt. No. 106 at 9).

IV. CONSTRUCTION OF DISPUTED TERMS

1. “six-axis motion sensor module” (’438 Patent claims 1, 5, 14, 15, 16, 17, 19)

CyWee’s Proposed Construction	Huawei’s Proposed Construction
This term need not be construed. In the alternative only, this term may be construed as: “a collection of components comprising a rotation sensor comprising one or more gyroscopes for collectively generating three angular velocities and one or more accelerometers for collectively generating three axial accelerations where said gyroscope(s) and accelerometer(s) are mounted on a common PCB”	“a module comprising (i) a rotation sensor and (ii) one or more accelerometers, said module not having and using measured magnetisms and predicted magnetisms”

Huawei presents the same basic dispute that was before this Court in the *Samsung* case. Huawei contends that in response to a double patenting rejection in the ’978 Patent, the applicants characterized the ’438 patent as not using measured and predicted magnetisms. Specifically, Huawei points to the amendment made in the ’978 Patent claims that added the limitations of a “nine-axis motion sensor module” that use “a plurality of measured magnetisms...and a plurality of predicted magnetisms.” Huawei also relies on the accompanying argument in which the applicants stated that the ’438 Patent “includes the claimed subject matter of a six-axis motion sensor module without having and using measured magnetisms and predicted magnetisms.” Dkt. No. 85 at 4-6; Dkt. No. 103 at 1-2.

Analysis:

Huawei misconstrues the double patenting amendment and arguments in question from the '978 Patent. The amendment and arguments limit the claims of the '978 Patent to the magnetism concepts, thus providing a distinction from the '438 Patent claims. But while the amendments and arguments point out that the earlier patent (the '438 Patent) did not *claim* magnetism, such arguments do not state that the '438 Patent claims were narrowed to only encompass non-magnetism (i.e. exclude magnetism). The rationale presented in the *Samsung* Claim Construction Order and the *Samsung* Order on Objections still applies. As noted by Judge Bryson:

Nothing in the prosecution history suggests that the applicants meant to suggest that the application that became the '438 patent would not read on a device containing a six-axis sensor simply because that device also contained a three-axis magnetometer and thus could be characterized as having a nine-axis sensor. No such disclaimer would have been required to avoid the double patenting issue raised by the examiner, and even if the language used by the applicants was not as precise as it might have been, it did not constitute the kind of “clear and unmistakable” disclaimer that would be necessary to surrender claim scope that is otherwise supported by plain claim language, as is the case here. *See Trivascular, Inc. v. Samuels*, 812 F.3d 1056, 1063–64 (Fed. Cir. 2016); *Elbex Video, Ltd. v. Sensormatic Elecs. Corp.*, 508 F.3d 1366, 1371–72 (Fed. Cir. 2007). That conclusion is supported by the language of the asserted claims from the '438 patent, which claim an apparatus or method “comprising” the recited components or steps, a term that means that the “device may contain elements in addition to those explicitly mentioned in the claim.” *In re Skvorecz*, 580 F.3d 1262, 1267 (Fed. Cir. 2009).

The Court therefore agrees with Judge Payne that no construction of “six-axis motion sensor” is necessary. The Court will prohibit Samsung from arguing to the jury that a device containing the claimed six-axis motion sensor does not infringe the '438 claims if it contains any other sensors, such as a three-axis magnetometer. If it appears there is some risk that the jury will understand the term to foreclose the presence of a magnetometer, the Court will deal with that risk by issuing an appropriate instruction.

Samsung Order on Objections at 4-5.

The Court finds that the term “six-axis motion sensor module” needs no further construction.

2. “signal set” (’438 Patent claim 1; ’978 Patent claim 10)

CyWee’s Proposed Construction	Huawei’s Proposed Construction
This term has its plain and ordinary meaning and need not be construed.	“a sensor’s x-axis measurement, y-axis measurement, and z-axis measurement.”

The parties dispute whether the signal set requires, and is limited to, a three-dimensional signal set. Huawei’s Sur-Reply also raises another issue, whether the signal is only actual electrical measurements from a sensor and not calculated values or estimated values.

Positions of the Parties

CyWee contends that this term would be understood by a person of ordinary skill in the art. Dkt. No. 79 at 19 (citing Dkt. No. 79-6 (“LaViola Decl.”) at ¶¶ 30, 33). CyWee contends that Huawei’s construction is redundant with other language of ’438 Patent claim 1 (“a first signal set comprising angular velocities ω_x , ω_y , ω_z ” and “a second signal set comprising axial accelerations A_x , A_y , A_z ”). As to ’978 Patent claim 10, CyWee contends that the claim *does not* require that the first and second signal sets include three values, but instead, merely requires a “first signal set comprising axial accelerations” and a “second signal set associated with Earth’s magnetism.” *Id.* CyWee further contends that because the claims are “comprising” claims, the signal sets could contain additional information.

Huawei contends that CyWee’s primary argument against Huawei’s construction is that the Court should leave room for “signal sets” that are not three-dimensional. Huawei contends that this runs counter to the patents’ basic purpose, which is to record and show movement in three-dimensional space. Huawei contends that this would confuse the jury. Dkt. No. 85 at 12.

Huawei contends that its construction arises from the specifications’ treatment of “signal set,” as the patents uniformly and repeatedly describe a “signal set” as a three-dimensional output from a single sensor. Dkt. No. 85 at 12-13 (citing ’438 Patent 7:64-66; 8:4-6; 8:46-56; 9:15-19;

11:36-44; 12:32-35; 12:64-13:4; '978 Patent 9:65-10:25; 11:15-27; 12:9-10; 15:10-17; 16:27-33; 16:60-17:5; 22:40-44; 24:42-44; 30:50-67; 33:37-47; 34:30-34; 34:43-52; 35:5-10). Huawei contends that its expert (Dr. Welch) also states that this is how a person of ordinary skill in the art would understand the term “signal set” in the context of the patents. Dkt. No. 85 at 13 (citing Dkt. 85-2 (“Welch Decl.” at ¶ 63). Huawei contends that CyWee’s argument is contrary to the patents’ entire purpose (to navigate three-dimensional space). Huawei contends that the specifications call the “present invention” three-dimensional ('438 Patent 1:15-23; '978 Patent 1:20-27) and that every reference to “signal set” in the specifications refers to a three-dimensional signal; and all of the signal set math in the patents is three-dimensional. Dkt. No. 85 at 13 (citing '438 Patent 12:32-13:43; '978 Patent 22:34-67, 31:4-50).

In reply, CyWee contends that Huawei’s proposed construction ignores that the claim terms at issue contain the word “comprising,” which allows the “signal sets” to include additional information beyond the three measurements contained in Huawei’s proposed construction. CyWee further contends that much of the intrinsic record cited by Huawei include broader, non-restrictive language. Dkt. No. 99 at 14, n. 14 (citing '438 patent 7:64-66 (“the first signal set *including* angular velocities”); 8:4-6 (“the second signal set *including* axial accelerations”); 12:32-35 (“which *includes* the measured angular velocities); 12:64-13:4 (“which *includes* measured axial accelerations”) (emphasis added)).

CyWee further contends that Huawei’s own expert (Dr. Welch) could not answer the question of whether a “signal set” must include *exactly* the three values espoused by Huawei, or whether it might include *less* than those measurements (Dkt. 99-2 (“Welch Tr.”) at 46:18-47:1; 48:6-10) and agreed that “there might be something in addition” to those three values within a “signal set” (Welch Tr. at 51:6-18). Dkt. No. 99 at 15.

CyWee further objects to Huawei's interpretation of Huawei's construction as presented in Huawei's expert (Dr. Welch) declaration. CyWee specifically points out that Dr. Welch stated that the word "signal" means "actual electrical measurements from a sensor and not calculated values or estimated values." Dkt. No. 99 at 15 (citing Welch Decl. ¶ at 63). CyWee contends that one other court has already held an overly-restrictive construction of "signal set" is improper. *CyWee Grp. Ltd v. Apple Inc.*, No. 14-CV-01853-HSG, 2015 WL 5258728, at *4 (N.D. Cal. Sept. 9, 2015) ("Defendant's position depends on an overly rigid construction of the term "signal sets" as 'raw data from the signal sets.'").

In its Sur-Reply Brief, Huawei contends that its construction captures the distinction between signal sets (reported by sensors) and calculated or predicted values (both generated during the operation of the claimed fusion algorithm), with "predicted" being used in this context not to mean "at a time in the future" but to mean "estimated and not directly measured" Dkt. No. 103 at 3-4 (citing Dkt. No. 105 ("LaViola Tr." at 59:20-60:11; 62:9-19)). Huawei contends that its proposed construction captures the concept that a signal set is a sensor's output, inclusive of any correction done by that sensor. Huawei contends that its construction avoids any ambiguity CyWee attempted to create during Dr. Welch's deposition and that CyWee now wishes to propagate to the jury regarding "corrections." *Id.* at 4. Huawei contends that during Dr. Welch's deposition, the questioning attorney conflated (1) "correcting" a signal set in the sensor before it is subject to the processing of the claimed algorithm with (2) "correcting" the output of sensor fusion according to the claims. Dkt. No. 103 at 4-5 (citing Dkt. No. 103-2 (Welch Deposition) at 54:2-13.) Huawei states that Dr. LaViola (CyWee's expert) acknowledged at his deposition that sensors such as commercial accelerometers, gyroscopes, and magnetometers have the ability to self-correct and/or calibrate to account for "factory" flaws or known local conditions. *Id.* (citing LaViola Tr. at 70:14-

72:6). Huawei contends that the application of these low-level corrections does not mean the corrected data is no longer a “signal set.” Huawei contends that on the other hand, the patents also use the term “corrected” to refer to the purpose of the claimed invention. Dkt. No. 103 at 4 (citing ’438 patent at 4:20-30 (“According to another aspect of the present invention, ... *accumulated errors associated with a fusion of signals* from a motions sensor module ... may be eliminated or corrected.”) (emphasis added)). Huawei states that it is not excluding self-correcting sensors as potential sources of the “signal sets” of the claims, merely differentiating between values used by the claimed algorithm (signal sets) and values created by the claimed algorithm (the calculated and predicted values used to correct errors “associated with a fusion of signals”). At the oral hearing, Huawei acknowledged that there is no dispute that the signal sets come from the sensors. Dkt. No. 110 at 23-25.

Huawei further states that Dr. Welch properly acknowledged that a signal set may contain more than the three values. Huawei asserts that that despite CyWee’s arguments, there is no attempt to construe the claims so that the inclusion of timestamps in a sensor’s output would mean that output is no longer a “signal set.” Dkt. No. 103 at 4.

Analysis

The first issue presented by Huawei focuses on whether a signal set must be defined in context of three-dimensional data only. As noted by CyWee, ’438 Patent claim 1 already includes this concept in other limitations (“a first signal set comprising angular velocities ω_x , ω_y , ω_z ” and “a second signal set comprising axial accelerations A_x , A_y , A_z ”). Such language is indicative that “signal set” on its own is not as limited as Huawei seeks. As to ’978 Patent claim 10, such language is not included and the claim is drafted more broadly. However, the claim itself still provides further limitations as to the particular signal sets by stating “generating a first signal set comprising

axial accelerations associated with movements and rotations of the 3D pointing device in the spatial reference frame” and “generating a second signal set associated with Earth.” It is further noted that even in ’978 Patent claim 10, when three axes are required, the claim specifically calls out such a requirement: “generating an orientation output associated with an orientation of the 3D pointing device associated with three coordinate axes of a global reference frame associated with Earth” and “generating a rotation output associated with a rotation of the 3D pointing device associated with three coordinate axes of a spatial reference frame associated with the 3D pointing device.”

Thus, the language of the claims defines when three axes are needed and provides additional language as to what the particular signal sets are. This is indicative that the “signal set” term itself does not provide the limitations sought by Huawei. Further, Huawei has not pointed to any lexicography or disclaimer limiting the claim terms as sought by Huawei. Huawei does contend that the only embodiment of the specification is three-dimensional. However, even a single embodiment is not necessarily enough to read a limitation into the claim from the specification. *Arlington Indus., Inc. v. Bridgeport Fittings, Inc.*, 632 F.3d 1246, 1254 (Fed. Cir. 2011) (“[E]ven where a patent describes only a single embodiment, claims will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using words of expressions of manifest exclusion or restriction.”). Further, as noted by CyWee there are repeated instances of the “signal set” being described more generically. ’438 patent 7:64-66 (“the first signal set **including** angular velocities”); 8:4-6 (“the second signal set **including** axial accelerations”); 12:32-35 (“first signal set...which **includes** the measured angular velocities); 12:64-13:4 (“second signal set...which **includes** measured axial accelerations”) (emphasis

added)). In context of the claim language and specification as a whole, the Court finds that the term is not limited as Huawei seeks.

Huawei's argument substantially shifts in the Sur-Reply Brief to a discussion of whether the signal sets are (1) the actual raw measurements of the sensors, (2) corrected measurements provided from the sensors or (3) corrected measurements provided by the pointing device using the correction algorithms described in the claims as being applied to the signal sets. It seems both parties agree that a sensor can have raw data and also provide its own corrections to that data. Huawei's construction does raise the possibility of being interpreted to only include the raw data; a construction that both experts indicate would conflict with what one of skill in the art would understand. Further, the actual claim language is clear that the signal sets may include other data as the claim terms are followed by language such as "comprising" and "associated"

a rotation sensor for detecting and generating a first signal set **comprising** angular velocities ω_x , ω_y , ω_z associated with said movements and rotations of the 3D pointing device in the spatial pointer reference frame

an accelerometer for detecting and generating a second signal set **comprising** axial accelerations A_x , A_y , A_z associated with said movements and rotations of the 3D pointing device in the spatial pointer reference frame

'438 Patent claim 1, and

generating a first signal set **comprising** axial accelerations associated with movements and rotations of the 3D pointing device in the spatial reference frame;
generating a second signal set **associated** with Earth's magnetism

'978 Patent claim 10. In the context of the surrounding claim language it is clear that the signal sets are not limited to merely the raw data but could be corrected data from a sensor. Further, as to the other corrections and processing of the claims, the claims describe the signal sets as being used in such processing, thus clarifying any confusion that Huawei contends could result regarding the correction limitations explicitly recited in the claims.

The Court finds that the term “signal set” needs no further construction.

3. “global reference frame associated with Earth” (’978 Patent claim 10)

CyWee’s Proposed Construction	Huawei’s Proposed Construction
This term need not be construed. In the alternative only, this term may be construed as: “reference frame with axes defined with respect to the Earth”	“reference frame with an origin at a fixed point on Earth” In the briefing, Huawei offers an alternative: “reference frame with an origin fixed relative to Earth” Dkt. No. 85 at 15-16.

The disputes between the parties center around whether the construction should recite the frame’s origin versus axes and whether “fixed” should be included in the construction.⁴

Positions of the Parties

CyWee contends that the term “global reference frame” or “global frame of reference” is a commonly used term of art, which refers to a fixed frame, against which the position and orientation of moving frames can be measured. *Id.* at 21 (citing LaViola Decl. at ¶ 123).

CyWee also points to this Court’s prior order:

[T]here’s no technical reason why the claimed invention would require any reference frame to have a specific origin given the ease with which a point in one frame can be mapped to another frame. Indeed, the ’978 Patent’s use of “frame

⁴ In the briefing CyWee further raised the concern that Huawei’s use of “on Earth” could be interpreted by a jury to mean literally on the surface of the Earth (as opposed to some other point such as the center of the Earth, a point above the Earth, etc.) even though the term only uses “associated with Earth.” Dkt. No. 79 at 20-22. Huawei clearly states that such a meaning is not intended in its construction and offered the use of “relative to Earth” to clarify. Dkt. No. 85 at 15-16. Further, the oral hearing made clear that Huawei was not limiting its construction to the surface of the Earth. Dkt. No. 110 at 42-50.

associated with” throughout the specification shows the location of the reference frame’s origin is not important.

Samsung Claim Construction Order at 12.

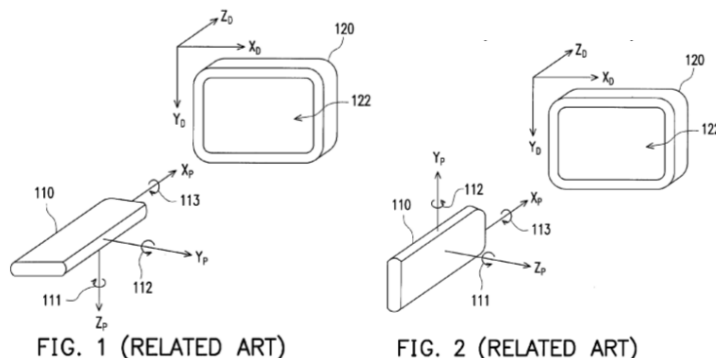
In response, Huawei notes that the patent describes a 3D pointing device and a 2D display. Dkt. No. 85 at 15 (citing ’978 Patent 11:48-50, Figure 5). Huawei points to the specification passage: “[f]or proper interaction with the use of the pointing device, when the user moves the pointing device, the pointer on the screen is expected to move along with the orientation, direction and distance travelled by the pointing device.” ’978 Patent 1:56-61 (numbering omitted). Huawei contends that the ’978 patent claims an improved mechanism for following movement of a pointing device on a display screen by using three reference frames: the “spatial reference frame” (which the parties have agreed is fixed to the “3D pointing device”), the “fixed reference frame associated with a display device” (which the parties agree does not require construction), and the “global reference frame associated with Earth,” which is the term in dispute. Dkt. No. 85 at 15.

Huawei contends that its construction just requires a reference frame that is fixed relative to Earth, whether fixed in the center of the Earth, fixed at the Earth’s surface, or fixed in the sky above the Earth. *Id.* at 17. Huawei contends that CyWee explicitly agrees when CyWee stated in its brief that “‘global frame of reference’ is a commonly used term of art, which refers to a fixed frame, against which the position and orientation of moving frames can be measured. LaViola Decl. ¶ 123.” Dkt. No.85 at 17 (quoting Dkt. No. 79 at 21).

Huawei contends that the North-East-Down (NED) or East-North-Up (ENU) reference frames are not relevant because such frames are not fixed. Rather, Huawei contends that such frames have an origin at the center of the sensor frame as acknowledged by CyWee, and thus move with the 3D pointing device. Dkt. No. 85 at 17. Huawei contends that such reference frames

conflict with the definition of “global reference frame” provided by CyWee and its expert. Further, Huawei contends that even the reference cited by CyWee distinguishes between the ENU frame and the “Earth Fixed Frame.” *Id.*

In reply, CyWee states that “[b]oth parties agree that a global frame must be fixed to the Earth in some manner.” Dkt. No. 99 at 16. CyWee contends that although the parties agree that the reference frame must be fixed in some manner to the Earth, Huawei’s construction does not reference axes at all and allows for a rotating reference frame so long as the origin is fixed. *Id.* at 17. CyWee contends that a global reference frame is different than a body frame or spatial reference frame such as that shown in Figures 1 and 2 (below) in which the axes (X_p Y_p and Z_p) move with respect to the device as the device is rotated.



Dkt. No. 99 at 17 (depicting ’438 Patent Figures 1, 2). CyWee contends that although Dr. Welch (Huawei’s expert) agrees that the global frame will not rotate, Huawei’s construction allows for a rotating frame. *Id.* (quoting Welch Tr. at 109:20-25 (“I cannot imagine that a person of ordinary intel[ligence] . . . who is looking at these patents would understand that a global reference frame as that term is used in the patents would be allowed to rotate, it simply wouldn’t make sense.”))

As to Huawei arguing that North-East-Down (NED) or East-North-Up (ENU) frames cannot be fixed, CyWee states that while the origin of such a frame begins in the sensor or body frame, it is a simple matter to fix the origin and axes at a specific time. Dkt. No. 99 at 17-18.

In its Sur-Reply, Huawei contends that Dr. Welch explained in his declaration and again at his deposition that if the origin of this reference frame is allowed to move with the device over time, then purportedly enabling disclosures will not function. Dkt. No. 103 at 5-6 (citing Welch Decl. at ¶¶ 73-74, 76-77). Huawei contends that CyWee and Dr. LaViola admit, in paragraph 53 of Dr. LaViola's supplemental declaration, that to be a "global reference frame associated with Earth" the reference frame must be fixed "at a specific point in time." *Id.*

Huawei contends that an origin that does not move with the pointing device is not fixed to the pointing device; it is fixed to the (relatively immobile) Earth. Huawei states that at Dr. LaViola's deposition, Dr. LaViola stated multiple times that the origin of the global reference frame had to be fixed such that during the performance of the claimed method it did not move when the pointing device moved. *Id.* (citing LaViola Tr. at 114:4-118:9; 120:4-13; 138:1-139:17).

Huawei states that its proposal is consistent with the *Samsung* Claim Construction Order's observation that the "precise location of the origin" of this reference frame is immaterial. Huawei states that what is material, as both experts agree, is that during the performance of the claimed methods, the origin not move as the device moves.

As to the "axes defined" with respect to Earth, Huawei contends that CyWee's own expert disavowed the correctness of requiring the axes to be defined. Specifically, Huawei points to the Dr. LaViola statement that "[s]o as long as you have the axes that are consistent with your first frame" then the axes do not have to be defined relative to the Earth and could instead (for example) be defined relative to the device. Dkt. No. 103 at 6 (citing LaViola Tr. at 134:11-139:17). Huawei contends that Dr. LaViola agreed that what matters is that when the pointing device is moving during a performance of the claimed method, the axes of the global reference frame (like its origin) do not change because of the movement of the device. Huawei states that this is what Huawei

meant when it wrote in its Responsive Claim Construction brief that it agrees that the global reference frame associated with Earth must have axes “fixed with respect to Earth.” *Id.*

Analysis

As to the usage of “axes” versus “origin,” the Court finds CyWee’s arguments more persuasive. Further, at the oral hearing, Huawei acknowledged that Huawei’s primary position was that at least one of (a) the axes or (b) the origin had to be fixed with respect to the Earth. Dkt. No. 110 at 43 (“you need to have the axes not moving while the device moves, and you need to have the origin not moving while the device moves ... at least one of those origin and the axes have to be associated with the Earth and fixed”), 47 (“And at least one of those [the location of the origin and the location of the axes] then has to be associated with the Earth and fixed with respect to the Earth”). Huawei further stated that it focused on “origin” because Huawei thought there might be a “possibility” that CyWee would argue to a jury that the origin that move. *Id.* at 49-50.

In addition, it is noted that the claim itself uses the term explicitly in context of the axes: “generating an orientation output associated with an orientation of the 3D pointing device *associated with three coordinate axes of a global reference frame associated with Earth*” (emphasis added, disputed claim term underlined). In the context of the claim itself, the construction of the global reference frame in relation to the axes is more correct and would be clearer to the jury. Similarly, the claims reference the spatial reference frame in context of the three coordinate axes, not the origin. In fact, the patent specification makes reference to the axes consistently throughout the specification without ever referencing the origin. In light of the claims, specification, and conflicting extrinsic evidence, the Court finds that a construction that uses “axes” is proper.

At the hearing, it became clear that the primary dispute relates to use of the “fixed” term. More specifically, the dispute focused on what the potential meaning of “fixed” was: fixed at all times, fixed at some point in time, fixed during one iteration of the claimed method, fixed during all uses of the claimed method, etc. CyWee agreed that “the global reference frame must be fixed in some manner. The axes must be fixed in some manner to the Earth, that is correct” and “the fact that the term itself is ‘global reference frame associated with Earth’ indicates that it’s fixed to the Earth in some manner.” Dkt. No. 110 at 33. CyWee stated that a reference frame that has at least one axis set in relation to the Earth may be “associated with Earth.” *See id.* at 34-37. Further, CyWee stated that the reference could be reset at various times while a pointing device is used. Thus, CyWee contends that the reference does not always have to be “fixed” to the same origin or axes but rather could change at different points in time, and still be associated with the Earth. *Id.* at 40-41.

Huawei, in contrast, argued that the key concept is that the global reference does not move as the pointing device moves. *Id.* at 43. Further, Huawei argued that though the specification does not teach that the global reference frame must be fixed, it would be known to one in the art that it must be fixed to be operable. *Id.* at 43-46. However, Huawei acknowledged that it does not matter if the global reference frame moved between uses of the device. *Id.* at 46-47. Huawei also acknowledged that by use of “fixed,” Huawei meant during one iteration of the claimed method. *Id.* at 47.

As to the “fixed” dispute, the Court finds CyWee’s evidence and arguments more persuasive. Further, Huawei’s construction inserts into the term the concept of “fixed” which even Huawei admits is not described in the specification with regard to a global reference frame. Also, as became clear at the oral hearing, the meaning of “fixed” can vary greatly over at what point in

time the frame is fixed to the Earth (fixed at all times, fixed at some point in time, fixed during one iteration of the claimed method, fixed during all uses of the claimed method, etc.). The term in question, however, only requires that the global reference frame be “associated” with Earth. In context of the claims themselves, the specification and the extrinsic evidence, the axes of the frame being defined with respect to Earth best conveys the concept of a global reference frame associated with Earth.

The Court construes “global reference frame associated with Earth” to mean “reference frame with axes defined with respect to Earth.”

- 4. “using the orientation output and the rotation output to generate a transformed output associated with a fixed reference frame associated with a display device” (’978 Patent claim 10)**

CyWee’s Proposed Construction	Huawei’s Proposed Construction
“using the orientation output and rotation output to generate a transformed output representing a movement in a fixed reference frame that is parallel to the screen of the display device.”	“using the orientation output and rotation output to generate a transformed output representing a two-dimensional movement in a fixed reference frame that is parallel to the screen of the display device.”

The parties dispute whether the movement should be “a movement” or “a two-dimensional movement.” The dispute between the parties is somewhat similar to issues raised in the *Samsung* case.

Positions of the Parties

Huawei contends that its construction comes straight from the specification: “The transformed output <dx, dy> ***represents a 2-dimensional movement*** in a display plane in the fixed reference frame.” ’978 Patent 31:51-32:3 (emphasis added). Huawei also points to other portions of the specification, contending that two-dimensions is what is described. Dkt. No. 85 at 20 (citing ’978 Patent at 31:56-67, 33:4-11).

CyWee contends that Huawei's construction would cause jury confusion as the language could be improperly understood by the jury to limit the movement of the pointing device to two-dimensional movement (i.e., the transformed output is based upon two-dimensional movement, instead of the three-dimensional movement that the patent teaches). Dkt. No. 99 at 19. Thus, CyWee contends that Huawei's construction could connote that the transformed output would not permit a two-dimensional depiction of three-dimensional movement. *Id.* CyWee further contends that Huawei's construction rests upon a faulty premise that the "movement" that is represented in a fixed reference frame must be "two-dimensional." *Id.*

In the Sur-Reply, Huawei contends that its construction is not reading out the creation of two-dimensional representations of three-dimensional movement. Dkt. No. 103 at 7. Huawei contends that all the parties agree that the "movement" of this claim term is the two-dimensional movement (on the screen) and not the other "movement" (the movement of the three-dimensional pointing device) recited in the claim. *Id.* Huawei contends that the movement of the term in question is the movement parallel to the screen which is necessarily a two-dimensional movement. Huawei contends that the "movement" of this term is not the "movement" of the three-dimensional pointing device but rather the transformed output that is associated with the screen.

At the oral hearing, CyWee further pointed to the embodiment of Figure 6 in which the display 682 is built-in to the moveable portable electronic device 600 itself. CyWee contends that in such case, the display itself may move and thus the display frame is not always fixed. *See* Dkt. No. 110 at 58-59.

Analysis

Huawei states that its construction is not meant to exclude three-dimensional movement of the pointing device. Still, the Court recognizes that there could be jury confusion as to the meaning

of “two-dimensional” in this claim term. Moreover, the passage cited by Huawei is merely an embodiment, and Huawei has not pointed to clear language of lexicography or disclaimer. Further, the specification provides guidance that the reference frame into which the data is being mapped (e.g., the reference frame of the display) is not required to be two-dimensional by using broader, more open ended language:

the deviation angles being compensated and accurately outputted in 3D spatial reference frame may be further mapped onto or translated into another reference frame such as the abovementioned display frame, for example a reference in two-dimension (2D).

’978 Patent 5:41-45. Similarly, the patent describes an embodiment in which the display screen itself may be handheld and moveable in three-dimensions. *See* ’978 Patent Figure 6, 13:5-59. Such an alternative embodiment further counsels against Huawei’s strict limitation to one of the embodiments of the specification. The construction adopted below conforms to that adopted in the *Samsung* Claim Construction Order. The Court’s prior guidance is still applicable, including:

In fact, Defendants’ proposed construction is taken almost verbatim from the specification. *See* ’978 Patent at 31:51–32:3 (“The transformed output . . . represents a 2-dimensional movement in a display plane in the fixed reference frame.”). Nonetheless, there’s no reason the claim scope should be limited to representing only two-dimensional movement given that the passage on which Defendants rely only relates to a particular embodiment. *See Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 904 (Fed. Cir. 2004) (“Even when the specification describes only a single embodiment, the claims of the patent will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using ‘words or expressions of manifest exclusion or restriction.’” (quoting *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1327 (Fed. Cir. 2002))). In fact, the specification contemplates that a 2D reference frame may be just one type of possible display reference frame. *See* ’978 Patent at 12:48–58 (referring to mapping the calculated deviation “to a display reference frame such as a 2D reference frame”).

Samsung Claim Construction Order at 13-14. The Court rejects Huawei’s inclusion of two-dimensional.

The Court construes “using the orientation output and the rotation output to generate a transformed output associated with a fixed reference frame associated with a display device” to mean “using the orientation output and rotation output to generate a transformed output representing a movement in a fixed reference frame that is parallel to the screen of the display device.”

5. “utilizing a comparison to compare the first signal set with the second signal set”
(’438 Patent claim 1)

CyWee’s Proposed Construction	Huawei’s Proposed Construction
This term need not be construed. In the alternative only, this term may be construed as: “determining or assessing differences based on a previous state associated with the first signal set and a measured state associated with the second signal set while calculating deviation angles”	Indefinite

The parties dispute whether “to compare the first signal set and the second signal set” is indefinite because it is not limited to a specific way to compare the sets. The parties did not present oral arguments regarding this term but rather relied only on the briefing. Dkt. No. 110 at 60, 67.

Positions of the Parties

Huawei’s positions differ somewhat from Samsung’s arguments in the *Samsung* case as Huawei does not argue that it would be unknown how to compare the angular velocities to the axial accelerations. Rather, Huawei states: “Indeed, the specification discloses a number of different ways of comparing angular velocities with axial accelerations, and one of ordinary skill in the art would know of myriad others.” Dkt. No. 85 at 23 (citing Welch Decl. at ¶95). Specifically, Huawei contends two approaches are disclosed in the specification and further states

that “a POSITA may employ any one of a variety of methods to ‘compare’ signal sets.” *Id.* (citing Welch Decl. at ¶¶94-96).

Huawei contends that the term is indefinite due to the fact that since the items being compared are disparate sets of information, “any number of ways to ‘compare’ are possible” and a person of skill in the art is not advised which approach to select. Dkt. No. 85 at 23.

CyWee contends that the mere fact that multiple ways to compare values exists does not render the term indefinite. Dkt. No. 99 at 2-3. (citing multiple cases finding breadth or the fact that a specific way a claim term is accomplished is not claimed does not render a claim invalid). CyWee contends that a particular way to compare is not claimed. CyWee states that the claim merely requires that the sets are compared. *Id.* at 4.

CyWee also notes that the specification states that:

The term of “comparison” of the present invention may generally refer to the calculating and obtaining of the actual deviation angles of the 3D pointing device 110 with respect to the first reference frame or spatial pointing frame $X_P Y_P Z_P$ utilizing signals generated by motion sensors while reducing or eliminating noises associated with said motion sensors;

’438 Patent 2:26-32. CyWee further notes that Judge Bryson also stated that “the term ‘comparison’ is specifically defined in the patent,” citing to this passage. *Samsung* Order on Objections at 10. CyWee contends that this supports CyWee’s alternative construction. Dkt. No. 99 at 1-2, 4.

Huawei contends that CyWee takes conflicting positions – on one hand arguing that the specification defines “comparison,” but on the other hand arguing that one skilled in the art may use many different ways of “comparing.” Dkt. No. 103 at 8-9. Huawei contends that even with the definition of “comparison” in the specification, it is the words that follow in the term “to compare the first signal set with the second signal set” that render the term indefinite. *Id.* at 9. Huawei notes

that the specification definition contrasted the meaning of “comparison” to “mapping,” but even replacing the “comparison” in the claim with the specification language does not clarify the subsequent meaning of “to compare” the two sets. *Id.* at 10.

Huawei quotes *Dow Chem. Co.* for the statement that “the existence of multiple methods leading to different results without guidance” in the intrinsic record “renders the claims indefinite.” *Id.* at 9 (quoting *Dow Chem. Co. v. Nova Chems. Corp.*, 803 F.3d 620, 634 (Fed. Cir. 2015)). Huawei contends that there are infinite ways to compare the sets and thus the claims fail to provide clarity.

Analysis

Huawei acknowledges that the specification teaches a way “to compare” and that one skilled in the art would understand that there are many ways “to compare.” Dkt. 85 at 23 (citing Welch Decl. at ¶¶94-96). The claim just requires “to compare” the sets; it does not mandate a specific method. Huawei’s argument reduces to more of an argument that a particular comparison method is not claimed, as opposed to a contention that “to compare” renders the term indefinite. Merely because a claim is drafted broadly and could cover a variety of methods does not automatically render a claim indefinite. *See Ultimax Cement Mfg. Corp. v. CTS Cement Mfg. Corp.*, 587 F.3d 1339, 1352 (Fed. Cir. 2009) (finding claim term not indefinite when a formula contained over 5,000 possible combinations when it sufficiently notified the public of the scope of the claims.) Here, there is no dispute that the claim requires “to compare” the data. That “to compare” is not limited to a specific method to compare does not render the term indefinite. As noted in the *Samsung* Order on Objections, “comparing the first signal set with the second signal set...[is] all reasonably definite.” *Samsung* Order on Objections at 10. This is distinguishable from the *Dow Chem. Co.* situation where the claim term in question was “a slope of strain hardening

coefficient greater than or equal to 1.3." *Dow Chem. Co.*, 803 F.3d at 631. Because the claim only covered a specific slope, the existence of different methods to determine the slope producing different results made it impossible to determine the scope of the claim. *Id.* at 631-35. Such is not the case here.

Further, the claim is not as unbounded as Huawei asserts because the surrounding claim language immediately before and after the claim term provides more detail regarding the comparing. First, detail is provided by telling what the purpose of the comparing is:

communicating with the six-axis motion sensor module to calculate a resulting deviation comprising resultant angles in said spatial pointer reference frame by ***utilizing a comparison to compare the first signal set with the second signal set*** whereby...

(claim term emphasized) and then, secondly, detail as to the comparison is provided after the term:

...by ***utilizing a comparison to compare the first signal set with the second signal set*** whereby said resultant angles in the spatial pointer reference frame of the resulting deviation of the six-axis motion sensor module of the 3D pointing device are obtained under said dynamic environments, ***wherein the comparison utilized by the processing and transmitting module further comprises an update program to obtain an updated state based on a previous state associated with said first signal set and a measured state associated with said second signal set; wherein the measured state includes a measurement of said second signal set and a predicted measurement obtained based on the first signal set without using any derivatives of the first signal set.***

'438 Patent claim 1 (emphasis added). Thus, not only does the claim clearly require "to compare the first signal set with the second signal set," the surrounding claim language and the specification provides instruction as to "comparison." In light of the clear language of the claim and specification, the claim term is not indefinite.

The Court finds that "utilizing a comparison to compare the first signal set with the second signal set" is not indefinite.

6. “comparing the second quaternion in relation to the measured angular velocities ω_x , ω_y , ω_z of the current state at current time T with the measured axial accelerations A_x , A_y , A_z and the predicted axial accelerations A_x' , A_y' , A_z' also at current time T” ('438 Patent claims 14, 19)

CyWee’s Proposed Construction	Huawei’s Proposed Construction
This term need not be construed. In the alternative only, this term may be construed as: “utilizing the second quaternion obtained from the measured angular velocities ω_x , ω_y , ω_z of the current state at current time T, the measured axial accelerations A_x , A_y , A_z , and the predicted axial accelerations A_x' , A_y' , A_z' also at current time T to obtain an updated state or updated quaternion.”	Indefinite

Positions of the Parties

Huawei primarily contends that the term does not explain what is being compared. Further, like the prior “to compare” term, Huawei contends that it does not specify how the comparing is done.

First, Huawei contends that the term fails to explain which values the claims call for comparing. Dkt. No. 85 at 25. Huawei summarizes the dispute as asking what it means by “comparing A with B and C.” Does it mean, for example, (1) comparing A with B and comparing A with C; (2) comparing A with some amalgamation of B and C; or (3) comparing A and B, A and C, and B and C? Dkt. No. 103 at 12 (citing Welch Decl. at ¶¶ 102-104). Thus, Huawei contends that the term may be interpreted in a number of manners including to mean that the first value is compared to the second and third values independently; that the second and third values are fused together and then the result compared to a third value; or that some combination of comparisons

is used. *Id.* Huawei further states that the exemplary embodiments in the specification also fail to resolve the ambiguity in this term as CyWee itself argues against limiting the claims to a direct comparison between values, arguing that indirect comparisons are within the scope of the patent. *Id.* (citing CyWee Opening Br. at 7). Huawei contends that an open-ended understanding of the claim language renders the language unclear as to the values to be compared and the comparison to perform. *Id.*

CyWee contends that Huawei's arguments fail for the same reasons as the prior term. CyWee contends that the mere fact that a claim can potentially cover multiple configurations does not render it invalid. Dkt. No. 99 at 5. CyWee contends that a particular way of comparing is not what is claimed, rather all the claim requires is comparing.

CyWee contends that what the claim language and specification does make clear is that this claim term describes a comparison between the predicted axial accelerations and the measured axial accelerations. *Id.* at 6. CyWee contends that this conforms to the specification. Specifically CyWee states:

As this Court has held, the methodology of the patents “does not invoke a precise apples-to-apples comparison and requires some conversion.” Samsung Order at 17. Thus a direct comparison is not required. As shown in Equation 1 and further illustrated in Step 720 of Figures 7 and 8, the second quaternion is obtained using measured angular velocities ω_x , ω_y , ω_z . '438 patent Equation 1, Fig. 7; LaViola Rep. Decl. ¶ 15. This equation is embodied in the language of the claim limitation requiring a “second quaternion in relation to the measured angular velocities ω_x , ω_y , ω_z . As Dr. LaViola testifies, Equations 2-4 teach a POSITA how to take this second quaternion and convert it to predicted axial accelerations as recited in the claim limitation, and as further illustrated in Step 730 of Figures 7 and 8. *Id.*

Dkt. No. 99 at 6.

As to the meaning of the term, CyWee states that the term recites a “comparison.” Dkt. No. 79 at 11. CyWee states that the '438 patent describes that a comparison may generally refer to

calculating and obtaining deviation angles. *Id.* (citing '438 patent 2:27-29, 4:53-59). CyWee contends that Figures 7 and 8 are flowcharts that illustrate a sensor fusion algorithm and the comparison of the claims. CyWee states that Figures 7 and 8 describe the use of three quaternions as part of the enhanced comparison method, as an iterative process or loop in which the comparison method is repeated over time. *Id.* CyWee states that the 1st quaternion (shown in Figures 7 and 8) represents orientation at previous time T-1, which may be initialized the first time through the loop. *Id.* (citing '438 patent Fig. 7 Step 705, 11:62-64). CyWee state that on subsequent iterations of the loop, the 1st quaternion is sourced from an updated quaternion (the 3rd quaternion). *Id.*

CyWee contends that the second quaternion is computed using the angular velocities ω_x , ω_y , ω_z originating from the rotation sensor (comprising one or more gyroscopes) at current time T ('438 patent 7:64-65, 9:16-17, 12:32-38) and the first quaternion described above. Dkt. No. 79 at 11. CyWee contends that the '438 Patent further illustrates this step through the use of Equation 1, which is used to compute the second quaternion shown as step 720 in Figures 7 and 8. *Id.* (citing LaViola Decl. at ¶75; '438 Patent 12:40-60 (describing Equation 1)). CyWee contends that the measured axial accelerations A_x , A_y , A_z originate from the accelerometer or accelerometers at current time T. *Id.* at 11-12 (citing '438 Patent Fig. 7 Step 725, 5:27-31; LaViola Decl. at ¶76). CyWee further states that the predicted axial accelerations are calculated at current time T. *Id.* at 12 (citing '438 patent Fig. 7 Step 730). CyWee contends that Figures 7 and 8 disclose that the second quaternion (from Step 720), measured axial accelerations (from Step 725), and predicted axial accelerations (from step 730) are used to obtain an updated state or updated quaternion (referred to as a 3rd quaternion in Step 735). *Id.*

CyWee then states that Equations 2-4 in the '438 Patent describe an embodiment having a predicted axial acceleration, which is derived from the second quaternion (which is computed in

Equation 1), and this quaternion is derived from the first quaternion and measured angular velocities (see Figs. 7 and 8). *Id.* at 12 (citing LaViola Decl. at ¶91). CyWee states that because the predicted axial acceleration is derived from the second quaternion, and a POSITA would understand that the second quaternion is normalized so that it represents orientation, the predicted axial accelerations would represent (and only represent) accelerations that stem from gravity (since gravitational acceleration is used to determine orientation). *Id.*

Huawei contends that when CyWee states that this claim term describes a comparison between the predicted axial accelerations and the measured axial accelerations, CyWee reads out the plain language of the claim which requires comparing a second quaternion with measured axial accelerations and predicted axial accelerations. Dkt No. 103 at 11. Huawei contends that in CyWee's expert's deposition, Dr. LaViola contended that the "second quaternion" was not involved in the comparison but only the source of the predicated axial acceleration. *Id.* at 12 (citing LaViola Tr. at 87:1-20, 160:24-161:2) Huawei contends that at other times, Dr. LaViola testified that there were two comparisons: one between the predicted axial acceleration and the measured axial acceleration and another between the result of that comparison and the second quaternion. *Id.* (citing LaViola Tr. at 90:14-91:9; 92:19-93:24). Further, Huawei contends that Dr. LaViola admitted that the three items being compared in this term were the same three items used in CyWee's alternative proposed construction, which recites "utilizing" the three items "to obtain an updated state or updated quaternion." *Id.* (citing LaViola Tr. at 94:3-97:18). Huawei states that if a person of ordinary skill in the art would understand this claim to recite that all three items are used to obtain a result, it suggests that such a person would also understand all three items, and not just two of them, must be compared in a single comparison. *Id.*

Finally, Huawei contends that as with the prior term, there could be many ways to perform the comparing (no matter what is being compared), thus rendering the term indefinite.

Analysis

At the oral argument, the positions of the parties became more well-defined. CyWee reiterated that it contends that the claim only requires comparing the measured axial accelerations to the predicted axial accelerations. Dkt. No. 110 at 68. In the nomenclature used above, this is “comparing B to C.” CyWee contends that support for this position can be found because the second quaternion (“A” in the nomenclature above) is used to generate the predicted axial accelerations. *Id.* at 68-69. CyWee contends that a direct comparison is not required and that because the predicted axial acceleration is based on the second quaternion, the claim limitation is met by merely comparing the measured axial acceleration to the predicted axial acceleration.

At the oral hearing, Huawei acknowledged to the Court that the term, if it has meaning, means comparing “A with B and C” or “A with B” and “A with C.” Dkt. No. 110 at 63-64. However, Huawei emphasized its position that merely interpreting the limitation to mean comparing the measured axial acceleration to the predicted axial acceleration was an improper interpretation of the claim. *Id.* at 65-66.

On this point, the Court agrees with Huawei. The claim limitation in question is:

comparing the second quaternion in relation to the measured angular velocities ω_x , ω_y , ω_z of the current state at current time T with the measured axial accelerations A_x , A_y , A_z and the predicted axial accelerations A_x' , A_y' , A_z' also at current time T

’438 Patent claim 14 (21:33-38), claim 19 (22:42-47). Further, the claims are clear that the predicted axial accelerations are calculated based on the measured angular velocities and that the second quaternion is the current state and is obtained from the measured angular velocities:

obtaining a current state of the six-axis motion sensor module by obtaining measured angular velocities ω_x , ω_y , ω_z gained from the motion sensor signals of the six-axis motion sensor module at a current time T...

calculating predicted axial accelerations A_x' , A_y' , A_z' based on the measured angular velocities ω_x , ω_y , ω_z of the current state of the six-axis motion sensor module...

said current state of the six-axis motion sensor module is a second quaternion with respect to said current time T

'438 Patent claim 14 (21:23-33), claim 19 (22:28-42). Thus, the claim limitations very clearly express the second quaternion, measured axial measurements and predicted axial measurements as distinct elements. CyWee, however, seeks to ignore this in the comparing limitation in question. Rather, CyWee seeks to interpret the claim term in the following manner (strike-through and underline indicating CyWee's changes:

~~comparing the second quaternion in relation to the measured angular velocities ω_x , ω_y , ω_z of the current state at current time T with the measured axial accelerations A_x , A_y , A_z and~~ with the predicted axial accelerations A_x' , A_y' , A_z' also at current time T

CyWee's construction conflicts with the explicit language of the claim limitation and the clear structure of the claim as a whole with regard to these elements. The specification further does not support CyWee's reduction of the claim language. For example, Figure 7 (and the corresponding text) describes "Obtain a current state (2nd quaternion) at T" in Block 720 which is formed from the measured angular velocities, "Obtain 'measured axial accelerations' of a measured state at T" in Block 725, and "Calculate 'predicted axial accelerations' of a measured state at T" in Block 730 which are obtained from the measured angular velocities. '438 Patent Figure 7, 11:5-15, 12:32-13:13. Then, in Block 735 it is the current state (2nd quaternion) which is compared to the measured state: "Obtain an updated state (3rd quaternion) by comparing current state with measured state." *Id.* at Figure 7, 11:15-18, 13:28-28. As summarized in the specification:

In other words, in one embodiment as shown in step 735, it is preferable to compare the second quaternion in relation to the measured angular velocities of the current state at present time T with the measured axial accelerations A_x , A_y , A_z as well as the predicted axial accelerations A_x' , A_y' , A_z' also at present time T. Following which, a result may be obtained as an updated state of the six-axis motion sensor module.

Id. at 13:28-28. The specification thus supports the explicit claim language that requires comparing the second quaternion (item “A” in the nomenclature above).

That the claim and specification may allow for the comparison to occur in a variety of manners (for example “A with B and C” or “A with B and A with C”), does not render the claim indefinite. The Court finds that as drafted the claim term on its face and in light of the accompanying specification informs “those skilled in the art about the scope of the invention with reasonable certainty.” *See Nautilus Inc.*, 134 S. Ct. at 2129. It is equally clear that the claim itself and the specification both require comparing the second quaternion. The Court explicitly rejects CyWee’s attempt to rewrite the term by construing the term as meaning comparing the measured axial accelerations with the predicated axial accelerations.

Having found that the term is not indefinite and having rejected CyWee’s construction of the term, the Court has resolved the dispute presented and finds that no further construction is needed. *See O2 Micro Int’l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1362 (Fed. Cir. 2008) (“district courts are not (and should not be) required to construe every limitation present in a patent’s asserted claims.”); *Finjan, Inc. v. Secure Computing Corp.*, 626 F.3d 1197, 1207 (Fed. Cir. 2010) (“Unlike *O2 Micro*, where the court failed to resolve the parties’ quarrel, the district court rejected Defendants’ construction.”).

The Court finds that “comparing the second quaternion in relation to the measured angular velocities ω_x , ω_y , ω_z of the current state at current time T with the measured axial

accelerations Ax, Ay, Az and the predicted axial accelerations Ax', Ay', Az' also at current time T” is not indefinite.

7. “generating the orientation output based on the first signal set, the second signal set and the rotation output or based on the first signal set and the second signal set”
(’978 Patent claim 10)

CyWee’s Proposed Construction	Huawei’s Proposed Construction
This term need not be construed. In the alternative only, this term may be construed as follows: “generating the orientation output based on (1) the first signal set (from an accelerometer), the second signal set (from a magnetometer) and the rotation output (from a rotation sensor or gyroscope) or (2) the first signal set (from an accelerometer) and the second signal set (from a magnetometer)”	Indefinite

The primary issues are (1) Huawei contends that the term is indefinite as it encompasses multiple possible embodiments and (2) Huawei contends that “based on” has an uncertain meaning for the same reasons as Huawei asserts “to compare” is indefinite. The parties did not present oral arguments regarding this term but rather relied only on the briefing. Dkt. No. 110 at 60, 67.

Positions of the Parties

Huawei contends that the term is indefinite because it could be interpreted in two manners: (A) a single embodiment in which the output is based on all of the first signal set, the second signal set and the rotation output and selectively based on only the first signal set and second signal set, or (B) the claim is directed toward two separate embodiments: one embodiment based on all of the first signal set, the second signal set and the rotation output and a second embodiment based on the first signal set and second signal set.

Huawei contends that CyWee’s expert provides three interpretations of the claim language:

- A) The orientation output is based on the first signal set (item 1 - accelerometer), the second signal set (item 2 - magnetometer) and the rotation output (item 3 – rotation sensor or gyro) or it is based on (1) and (2);
- B) The orientation output is based on (1) and (2) and optionally (3); or
- C) The orientation output is based on (1) and (2) when the device is stationary and based on (1), (2) and (3) when the device is moving.

Dkt. No. 85 at 27 (citing LaViola Decl. at ¶¶103, 111). Huawei contends that the patent does not teach performing one type of comparison when the device is stationary and one type of comparison when the device is moving. Huawei also contends that the patent does not teach that the gyroscope is optional. *Id.*

Huawei also contends that “based” is unbounded in scope for the same reasons that Huawei argued with regard to “to compare”

CyWee contends that the term is clear: the orientation is based on either three recited elements or is based on two of the three recited elements. CyWee contends that the three interpretations of CyWee’s expert presented by Huawei are all consistent with CyWee’s interpretation. CyWee contends that interpretations (A) and (B) above are essentially the same and consistent with CyWee’s construction. CyWee further contends that interpretation (C) is consistent as one skilled in the art would know a subset of the data (items 1 and 2) is only needed when the device is stationary. Dkt. No. 99 at 7 (citing Dkt. No. 99-1 (“LaViola Rep. Decl.”) at ¶¶24, 28).

CyWee contends that because the clear language articulates two possible embodiments this demonstrates that though the term is broad, it is sufficiently definite to inform the public of the scope. *Id.* at 8 (citing *Ultimax Cement Mfg. Corp.*, 849 F.3d at 1352). CyWee contends that the fact that the claim may cover a single embodiment or multiple embodiments is an issue of breadth, not indefiniteness. *Id.*

As to “based on,” CyWee contends that Huawei’s argument fails for the same reason that the Huawei’s “to compare” argument fails.

In the Sur-Reply, Huawei states that the term recites generating output based on “A” (three components) or based on “B” (two components). Huawei contends that there are two interpretations of this. First, the claim may be directed to a method that is capable of both “A” and “B” but, depending on unclaimed details, does one or the other. Second, the claim is a compound claim, directed to methods that generate output based on “A” and to other methods that generate output based on “B.” Dkt. No. 103 at 13.

Huawei contends that CyWee’s expert also is not clear because it is not certain as to whether the claim requires a method that uses both “A” (three components) and “B” (two components) or whether the claim requires a method that only uses one of “A” and “B.” *Id.* Huawei contends that thus it is unclear as to whether a method that always uses a gyroscope (the third component) infringes. Likewise, Huawei contends that CyWee’s expert was not clear as to whether all three components must be used if all three were available *Id.* at 13-14.

Analysis

The literal language of the claim clearly describes the use of two components or the use of three components. Huawei complains that this could encompass methods that only use two components, methods that only use three components or methods that use two components at certain times and three components at other times. That the claim is drafted broadly enough to cover multiple embodiments does not render the claim indefinite. On its face, the claim language clearly allows the use of two components or three components and does not exclude differing uses at different times.

As to the “based on” arguments, the Court finds such term sufficiently definite and that the term does not require a specific “based on” method, similar to the analysis of “to compare” in the prior term discussed above.

The Court finds that “generating the orientation output based on the first signal set, the second signal set and the rotation output or based on the first signal set and the second signal set” is not indefinite.

V. CONCLUSION

The Court adopts the above constructions. The parties are ordered to not refer, directly or indirectly, to each other’s claim construction positions in the presence of the jury. Likewise, the parties are ordered to refrain from mentioning any part of this opinion, other than the definitions adopted by the Court, in the presence of the jury. However, the parties are reminded that the testimony of any witness is bound by the Court’s reasoning in this order but any reference to claim construction proceedings is limited to informing the jury of the definitions adopted by the Court.

SIGNED this 6th day of December, 2018.


ROY S. PAYNE
UNITED STATES MAGISTRATE JUDGE